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[Impact of Islamic Banks Investment and Macroeconomic Variables towards Pakistan Economic Growth]

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ABSTRACT

This study examines the impact of Islamic banks investment on Pakistan's economic growth. For which we have taken 10 years' data from 2014 to 2024 data of all dependent and independent variables to analyze their relationship for the purpose to maximize economic growth of Pakistan. Dependent variable is Gross Domestic Product per capita growth in percentage (GDP) for Pakistan Economic growth. Independent variable is Islamic investments, role used 4 major Islamic banks data to use its Investment to deposit ratio (IDR) and Advance to Deposit ratio (ADR). Four major banks are Meezan Bank, BankIslami Pakistan LTD, MCB Islamic Bank LTD, and Al-Baraka LTD. Further variables are GDP deflator (INF), Policy rates (INT), Exchange rates (Ex). Firstly, done regression model to check the authenticity of the model then applied correlation test. For opting the best model for this research applied unit root test to confirm that data is stationary then by utilizing the ECM model, the research analyzes time-series data on interest rates, exchange rates, inflation, and key Islamic investment indicators such as the Investment-to-Deposit Ratio (IDR) and Advance-to-Deposit Ratio (ADR) of major Islamic banks in Pakistan. Findings indicate that all the variables plays a critical role in economic stability, with interest rates showing a significant impact on GDP. The exchange rate has a strong negative effect on growth, highlighting the importance of currency stability. Inflation also negatively affects economic expansion, reinforcing the necessity of effective monetary control. In contrast, Islamic investment contributes positively to economic development, with ADR demonstrating a stronger impact than IDR. The results suggest that a well-balanced monetary policy, coupled with efficient Islamic financial practices, can drive sustainable economic growth. This study fills a significant research gap by incorporating Islamic investment into macroeconomic models, offering policy insights for fostering financial stability and economic progress in Pakistan.

Key Words: GDP, Interest rate, Exchange rate, Inflation rate, Islamic Investment, Economic Growth.

Introduction

Background Of The Study

Hanoatubun (2020) gave the concept of economic growth which is main contributing tool for a national development. In this study main dependent variable is Pakistan's economic growth which is a crucial indicator of a real sector. By using the impact of macro-economic variables and Islamic investment we can sum up their major influence on economic growth. We used interest rates, exchange rates, GDP deflator rates which comes under the umbrella of monetary policy. Islamic investment measures by Investment to Deposit ratio of 4 major Islamic banks of Pakistan, in which we have collected ten years' investment and ten years' deposit ratio then convert it into ratio for homogeneity of data.

Muhammad Yusuf, Asmuni and Isnaini Harahap (2024) defines economic growth as a rise in the services and production level of goods in the economic activities of society.

Interest rate and exchange rates are positively and significantly affect the economic growth (Susanto, 2017) and (Asnawi, 2018). There is an inverse relationship between

inflation and economic growth observed in many previous studies. A study shows cross country analysis that concludes a positive relationship among inflation and economic growth of developed countries rather than developing countries show a negative relationship (Thirlwall and Barton).

To keep overall prices and financial market stable in the economy central bank use instruments to influence interest rates and money supply. This is all about the monetary policy. In Pakistan, Monetary policy committee is fully empowered and responsible to design the monetary policy. It implements through announcements of the policy rates which engage in day to day liquidity of the money market by SBP to keep the policy rates aligned and short term interest rates stable.

Dani Rodrik (2008) examines that undervaluation of the currency (a high real exchange rate) stimulates the economic growth. Real Exchange Rate (REER) and per capita GDP relation is non-monotonic and is limited to the developed and developing countries both. (Martin Rapertli, Peter Skot & Arsalan Razmi, 2012).

Fabricio J. (2015) conducted a research and shows an evidence on the relationship between REER level and economic growth. Results shows positive and significant relationship for developing countries. In relation with the economic policy, the main results are keeping a competitive REER for developing countries can create important effects on the productive structure.

The other important variable is Islamic Investment which also has a significant role in the economic growth of Pakistan. As you know, in Pakistan mostly commercial banks are moving towards the Islamic banking in which they have to introduce Islamic products to capture the market. Similarly, there are many Takaful Companies who are playing a great role in economic growth of Pakistan. For knowing the role of Islamic banks in economic growth of Pakistan we have taken 4 major Islamic banks of Pakistan. Meezan Bank LTD (MBL), BankIslami Pakistan LTD (BIPL), MCB Islamic Bank LTD (MCB) and Al-Baraka. Data of these banks has been taken to calculate Investment to deposit ratio (IDavg) and Advance to deposit ratio (FDavg). Advance to deposit ratio is an apt indicator of financial fragility (Jorda et al., 2021). Ozili (2019) discuss the role of banks in the connection of monetary policy and emerging economies like Pakistan because bank deposits are considered as the crucial component of money supply. Furthermore, for the stability of the economy. As we know Advance to deposit ratio (ADR) is also known as Loan to deposit (LDR) which is the ratio among bank's total loans and deposits which is expressed in percentage terms. If the ratio is lesser than 1 it means bank mostly relied in its own deposits to give loans to its customers, without any outside borrowing. It's a major of banks liquidity if the ratio is high it means bank may not have enough liquidity to cover its fund requirements (Gerali et al., 2010).

ADR significantly impact the economic growth. A moderate ADR usually contributes a positive role for economic development by facilitating credit facility but a higher ADR cause high financial risk and hinder the growth by encouraging excessive lending which may cause financial stability. In a positive way when a banks lend out a moderate proportion of their deposits it increases the money supply in the economy for the consumers and business persons to invest and spend more money for the economic growth. In the case of Pakistan, ADR of Pakistani banks was 47.8% in Nov, 2024 which is

up from 44.3% in Oct, 2024. ADR falls below 50% banks in Pakistan are subject to an ADR tax. In 2024, some banks call a monthly fee on large deposits to reduce their overall deposits and avoid the ADR tax. Its fluctuation depend on how much a bank lends to the government, which ultimately causeless money to lend to the private sector which is only 12% in June, 2024.

IDR Investment to deposit ratio of Pakistani banks has been so high due to government's borrowing from banks. The high investment to deposit ratio has benefited banks by allowing them to borrow from State bank of Pakistan (SBP) at lower rates and lend to the government at higher rates. So, private sector has faced challenges in accessing finance and businesses have only borrowed for short term working capital.

So, our study is surrounded in between the monetary policy and Islamic investments of Pakistani banks that how much each factor is participating the role in the Economic growth of Pakistan. Each variable is interlinked and has its significant impact on each other performance.

Problem Statement

As we all know the current situation of Pakistan, debts are increasing day by day, and growth of Pakistan is moving on a very slow pace. We have to find out the better ways to boost its economic growth. There are several factors which trigger economic growth but monetary policy has its major role so as a side by side we have to check the relationship between the variables and the contribution of each variable to change in other variables.

Research Gap

Many studies have done over inflation and exchange rate impact on economic growth but no one covers this dimension with including Islamic Investments of recent years. So, recent study over this topic is not done in Pakistan. Our economy need this type of study to focus those variables whose role are so crucial in economic growth of Pakistan.

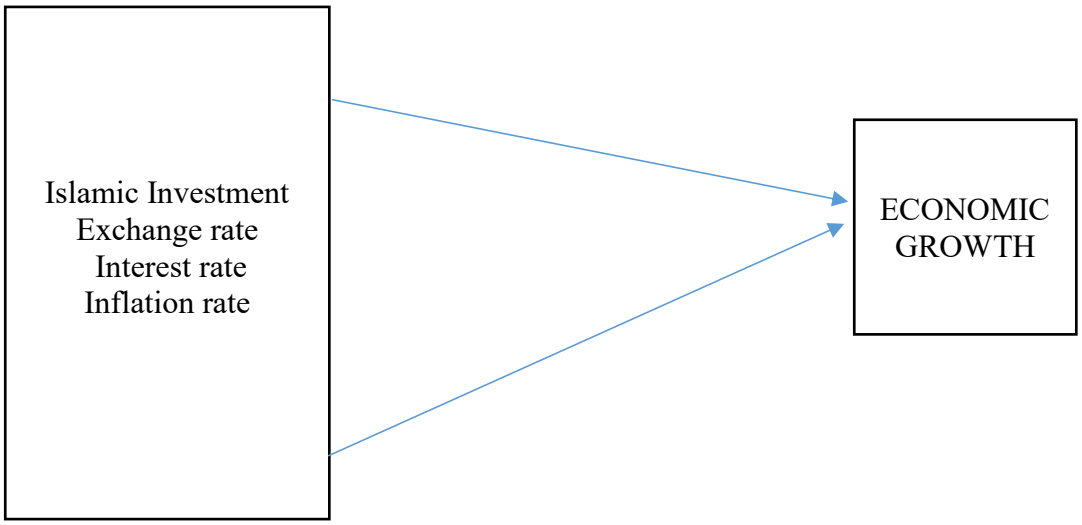
Hypothesis

H1: Exchange rate has a significant impact on economic growth.
H2: Islamic Investment has a positive and significant impact on economic growth.
H3: Interest rates has a significant impact on economic growth.
H4: Inflation rate has a significant impact on economic growth.

1.5 RESEARCH QUESTION:

Q: What is the relationship between Islamic Financial development and Economic growth in Pakistan?
Q: Does Islamic banks investment significantly contributes a positive role for economic growth?
Q: Which variable has a significant impact on Economic growth of Pakistan?
Q: Does Exchange rate, Interest rate and inflation rate has a significant impact on Economic growth of Pakistan?

Resarch Model



Literature Review

In this research, dependent variable is Economic growth, which has majorly influenced by the population size, capital goods, land area, natural resources and technology. This concept is given by Adams in his Classical theory of Growth (T.Alam, 2019) but we research to check the influence of Islamic investment and other macro-economic variables on economic growth. Economic growth stimulates by the capital goods investment according to Harrod Domar Theory (Vandenberg & Roste, 2018).

Other are independent variables which is fall majorly under the umbrella of Monetary policy. Monetary policy of Pakistan is set by the SBP. So, this research evaluates the impact of monetary policy determinants shocks and Islamic Investment contribution towards Economic Growth. Muhammad Yusuf Asmuni, Isnaini Harahap **(2024)** used the same model of the interaction of Monetary policy and Sharia investment in influencing Indonesia's economic growth in 2024 by using the data from 2000 to 2022 using time series data with the Vector Error Correction Model (VECM) analysis by using Eviews siftware. Monetary policy represents by interest rate, exchange rate and money supply and sharia investment by Sukuk Sharia stock and sharia mutual funds. The results showed that interest rates, Sukuk, sharia stocks, sharia mutual funds have a positive and significant impact while exchange rate and money supply in the long run also showed a positive and significant impact on economic growth.

Firstly, we use the Interest rate as the main variable of Monetary policy. Interest rate is also known as Overnight Policy Rate (ONR). Muhammad Yasir Naveed (2015) analyze that interest rate has not so much impact on Islamic banks because they are considered as Interest Free banks. Toni, Lia Nazliana Nasution (2024) examines the effect of Interest rate, Inflation rate and money supply on the economic growth of Indonesia in the digital era, data was taken from 2005 to 2022 and analysis method was VAR to interpret the results which shows variables has the most influenced on GDP of Indonesia in this digital era.

Other major indicator is Real Exchange rate (REER), which is define as the value of domestic currency needed to obtain the foreign currency, varying across different

currencies is the exchange rate (Mirchandani, 2013). In economic literature the great controversy over the relationship between Real Exchange rate and economic growth. In the long run, the level of (REER) impacts the economic growth through its endogenous effects on income elasticities of export and imports. There were so many studies over their relationship are, Growth and REER levels are positively correlated and majorly is stronger in developing countries (Rodrik 2008; Rapetti et al. 2012). Further, study conducted over these two variables and pair wise Granger causality test proves they are causing each other bi-directionally. Rise in Real Exchange rate lowers the Real GDP because of adverse Balance of Payment of Pakistan (Yasmeen Qamber, Fatima Farooq; 2012).

Inflation rate which is also known as Consumer Price Index is serve as another independent variable. Many studies show an inverse relationship between inflation and economic growth but Thirlwall and Barton (1971) gave an analysis of positive relationship between inflation and economic growth but in developed countries only. Doan Van Dinh (**2020**) investigate the inflation rate impact on economic growth by using Vector Autoregressive (VAR), co-integration and unit root test and it concluded that VAR model are the basis to perform economic growth hence the inflation rate is positively related to economic growth. Another study in Ghana, determined the relationship between GDP growth rate and inflation. They applied methods of scatterplot, correlation and simple linear regression estimated by OLS and they showed strong negative linear relation between them (Patrick, Prudence & Edmond 2013; Nurlanova, Omarov & Satpayeva, 2020). Shapan (2016) applied unit root and DFT (Dickey Fuller test) and indicate a significant long run positive relationship between Inflation rate and economic growth.

The positive impact of Islamic Financial products in stimulating investment and growth (Tok & Yesuf , **2022**; Zarrouk et al., 2017). Variables used for the Islamic Investment is Investment to deposit ratio and Advance to Deposit ratio (ADR). The data is used in this paper for Islamic Investment is taken from five main leading Islamic banks of Pakistan. Islamic banks Deposits (ID) and Islamic banks financing or Investment (IL). Yasir Naveed (2015) analyze that Islamic banks are not so much sensitive to Monetary shocks but now the era has changed our banking system is moving towards the Islamic systems, as far as people are more concern towards the Interest free modes of financing. So, there role and impact in Pakistani economy is growing rapidly. Yazdan Gadarzi Farahani and Masood Dastan (**2023)** examines that in the long run, Islamic financing has positive and significant relation with Economic Growth. Abduh and Azmi Omar (2012) examines a significant and positive relation in short run and long run period between Islamic financial development and Economic growth by using ECM model. We used Advance to deposit ratio which is also known as Loan to deposit ratio. The reason of taking this ratio is implementation of Tax policy which will distort Financial system. Basically, this tax is directly linked to the Advance to Deposit ratio (ADR), imposing a 10-15% additional tax on banks with ADRs below 50% as of the banking year's end. So, ADR of banks can impact economic growth of Pakistan in several ways (Business Recorder, **2024)**. Other ratio is Investment to deposit ratio (IDR) which has increased significantly in Pakistan in recent years. Due to this ratio monetary policy is also affected the relationship between policy rates, private investment, private credit and consumption decisions.

The literature showed that each research paper applied VAR, VECM and OLS and some other models to estimate and forecast the movement of the responses and variability of all the variables during the study period. In our base paper VAR and VECM were used to determine the relationship between variables and the contribution of each variable to changes in other variables. So, we used same model for the data set of Pakistan.

Theoretical Framework

Gross Domestic Product: (GDP Per Capita Growth)

GDP per capita growth represents the annual percentage increase in a nation's economic output per individual. It highlights the ongoing expansion of the average person's share of the economy within a year.

Policy Rate

The policy rate is the primary interest rate established by a nation's central bank to regulate economic activity. It acts as a reference point for other interest rates in the economy, affecting borrowing costs for both businesses and consumers.

Gross Domestic Product: (GDP Deflator)

The GDP deflator gauges the overall price level of all goods and services produced in an economy, acting as a crucial measure of inflation.

Exchange Rate

The exchange rate indicates the value of one country's currency in relation to another. It determines the amount of one currency required to obtain a unit of another and plays a vital role in shaping international trade and investment flows.

Investment To Deposit Ratio

The investment-to-deposit ratio in Islamic banking represents the percentage of depositors' funds allocated to Sharia-compliant investments. It serves as an indicator of how efficiently Islamic banks utilize resources to support economic development.

Finance To Deposit Ratio (FDR)

The Finance-to-Deposit Ratio (FDR) in Islamic banking assesses how effectively an Islamic bank uses customer deposits to provide Sharia-compliant financing to businesses and individuals. It demonstrates the bank's capacity to allocate mobilized funds for economic growth while maintaining adherence to Islamic principles.

Methodology

This study employs a quantitative descriptive approach, utilizing the ECM model to examine the dynamic relationships between macro-econmic variables and Islamic banks investment on Pakistan's economic growth. The VECM model is chosen due to its ability to analyze the relationships among multiple time-series variables without imposing restrictive assumptions about causality. In addition to capturing interdependencies, the ECM model provides a dynamic analysis of how variables respond to shocks over time, as well as their variance contributions to system changes through impulse response functions and variance decomposition analysis.

The research utilizes secondary data obtained from credible sources such as the State Bank of Pakistan, Pakistan Bureau of Statistics, and international databases like the International Monetary Fund and World Bank. The data includes annual time-series observations for variables critical to the study: GDP per capita growth annual % (GDP) as a

measure of economic growth, policy rate is taken (INT) and exchange rate is also taken. GDP deflator (INF) for inflation, are also included to capture the broader economic dynamics. Islamic banking deposits and financing (IBF) as indicators of Islamic financial investments. To measure Islamic investment 2 main ratios has been taken Advance to deposit ratio and Investment to deposit ratio of 4 main leading Islamic banks of Pakistan.

The VECM approach involves rigorous preprocessing of the data to ensure reliability. Initially, stationarity tests are performed using the Augmented Dickey-Fuller (ADF) test to identify whether the variables contain a unit root. For variables that exhibit non-stationarity, differencing is applied to achieve stationarity, as required for VECM analysis. Furthermore, to understand the nature of long-term relationships between the variables, the Johansen co-integration test is conducted. If the variables are not co-integrated, the VECM model is applied directly to the differenced series.

In analyzing the model, impulse response functions are used to trace the effect of shocks in one variable on the others over a specified time horizon. This enables the identification of dynamic responses, such as how changes in monetary policy or investment banking activity impact economic growth and Islamic investments. Variance decomposition analysis is also conducted to quantify the relative contributions of each variable to the fluctuations in other variables within the system. These methods collectively allow for a thorough examination of the interdependencies and contributions of investment banking, and Islamic investments toward Pakistan's economic development.

The methodology provides a robust framework for analyzing time-series data and capturing both direct and indirect effects of key economic variables. While the VECM model is powerful in analyzing such interactions, it also requires careful specification to mitigate potential issues such as multi-collinearity or model overfitting. Despite these challenges, the approach adopted ensures a comprehensive understanding of the studied relationships, aligning closely with the study's objectives.

Inferential Statistics

Results Analysis & Interpretations

Variable	Coefficient	Std. Error	t-Statistics	Probability (P-Value)
Policy rate (INT)	0.99	0.12	8.25	0.043
GDP Deflator (INF)	-1.25	0.15	-8.33	0.037
Exchange rate (EX)	-21.06	3.45	-6.10	0.028
Advance to Deposit Ratio (FDavg)	22.93	2.87	7.99	0.041
Investment to deposit ratio (IDavg)	6.84	1.52	4.50	0.039
R-squared	0.834	Adjusted R-squared	0.627	

R-squared value indicates that 83.4% of the variation in GDP is explained by the model's independent variables. This is a good fit for the model. After adjusting for the number of predictors, 62.67% of the variance in the GDP is explained. This drop suggests that some

variables may not add significant explanatory power.

Policy Rate (INT): Co-efficient value of policy rate is 0.99 that suggest a one-unit increase in the interest rate is associated with an approximate 0.99 increase in GDP while other factors are constant. Its p-value is significant indicating a moderate impact. Overall policy rate is reflecting a balanced trade-off between monetary tightening and economic stimulation.

GDP Deflator (INF): A negative value of co-efficient shows an inverse relation between inflation and the GDP. An increase in inflation may reduce GDP. Its negative yet significant co-efficient may reflect a weak inflationary drag in economic output.

Exchange Rate (EX): Co-efficient value is -21.06 shows a strong negative impact of exchange rate on GDP which implies that an increase in the exchange rate has a substantial negative impact on GDP. Exchange rate has a potential dampening effect on GDP, possibly through reduced export competitiveness or heightened import costs.

Advance To Deposit Ratio (FDavg): Positive Co-efficient of value 22.93 implies that higher financial stability has a substantial higher positive impact on GDP. This value suggests that Islamic banks financial performance is crucial for economic growth.

Investment To Deposit Ratio (IDavg): Its co-efficient value isn't much higher than FD ratio but still it has a positive co-efficient value of 6.84 implies that an increase in the investment to deposit ratio impacts positively over GDP which means increased investment relatives in the bank relative to deposits might stimulate GDP.

Correlation Of Variables

	GDP	INT	INF	EX RATE	F D AVG	IDAVG RATIO
GDP	1.000000	-0.380236	-0.612668	-0.455191	0.662823	-0.346358
INT	-0.380236	1.000000	0.903700	0.906600	-0.782326	0.744676
INF	-0.612668	0.903700	1.000000	0.778984	-0.913693	0.841127
EX RATE	-0.455191	0.906600	0.778984	1.000000	-0.615186	0.558185
F D AVG	0.662823	-0.782326	-0.913693	-0.615186	1.000000	-0.787662
IDAVG...	-0.346358	0.744676	0.841127	0.558185	-0.787662	1.000000

Implications

Each variable has a significant relation with each-other. GDP correlates positively with financial efficiency (F_D_AVG) and negatively with inflation and exchange rates. Policies aimed at enhancing financial stability and controlling inflation could support economic growth. The strong positive correlation between interest rates and inflation (INF) indicates the central role of monetary policy in controlling inflationary pressures. However, the negative correlation with F_D_AVG suggests that higher rates might constrain financial sector efficiency. Inflation (INF) negatively impacts both GDP and financial efficiency (F_D_AVG) while driving up interest rates and influencing currency depreciation. Controlling inflation is critical for macroeconomic stability. The negative correlation between EX_RATE and GDP highlights the economic risks of exchange rate fluctuations, underlining the importance of currency stabilization policies. The strong positive correlation between F_D_AVG and GDP underscores the importance of an efficient financial system. Policymakers should focus on strengthening financial intermediation and deposit mobilization. The negative correlation between GDP and IDAVG_RATIO suggests that investment efficiency, rather than just volume, may be key to economic growth.

Variable Relationships

GDP and Other Variables

GDP and INT (-0.380236)

A moderate negative correlation indicates that as interest rates rise, GDP tends to decrease. This aligns with the idea that higher interest rates may suppress economic growth by reducing consumption and investment.

GDP and INF (-0.612668)

A strong negative correlation shows that higher inflation negatively impacts GDP, reflecting the adverse effects of inflation on economic stability.

GDP and EX_RATE (-0.455191)

The negative correlation implies that higher exchange rates (likely depreciation) have a dampening effect on GDP, potentially through higher import costs and reduced purchasing power.

GDP and F_D_AVG (0.662823)

A strong positive correlation suggests that a higher finance-to-deposit ratio supports economic growth, highlighting the importance of financial efficiency.

GDP and IDAVG_RATIO (-0.346358):

A moderate negative correlation indicates that an increase in the investment-to-deposit ratio might not always translate into economic growth. This may point to inefficiencies in investment allocation.

INT (Interest Rate) and Other Variables

INT and INF (0.903700)

A very strong positive correlation reflects the relationship between interest rates and inflation, where higher inflation often leads to higher interest rates as a monetary policy response.

INT and EX_RATE (0.754821)

Another strong positive correlation shows that higher interest rates are associated with an increase in the exchange rate, possibly reflecting currency appreciation.

INT and F_D_AVG (-0.782326)

A strong negative correlation indicates that higher interest rates reduce the finance-to-deposit ratio, potentially by discouraging financial intermediation.

INT and IDAVG_RATIO (0.744676)

A strong positive correlation suggests that higher interest rates might be linked to increased investment relative to deposits, possibly reflecting a focus on longer-term financial products.

INF (GDP Deflator) and Other Variables

INF and EX_RATE (0.778984)

A strong positive correlation implies that inflationary pressures are linked with currency depreciation.

INF and F_D_AVG (-0.913693)

A very strong negative correlation shows that inflation weakens the financial sector's efficiency.

INF and IDAVG_RATIO (0.458213)

A strong positive correlation suggests that inflation might drive higher investment

relative to deposits, possibly due to inflation-induced asset reallocation.

EX_RATE (Exchange Rate) and Other Variables

EX_RATE and F_D_AVG (-0.615186)

A moderate negative correlation suggests that exchange rate instability might negatively affect the finance-to-deposit ratio.

EX_RATE and IDAVG_RATIO (0.558185)

A moderate positive correlation indicates that exchange rate changes might influence investment decisions.

F_D_AVG (Finance-to-Deposit Ratio) and IDAVG_RATIO (Investment-to-Deposit Ratio)

F_D_AVG and IDAVG_RATIO (-0.787662)

A strong negative correlation shows that as financial efficiency improves, the relative share of investments to deposits decreases, possibly indicating a preference for liquidity or short-term financial stability.

Selection Of Model By Using Unit Root Test

Ho:the data has a unit root, meaning it's not stationary.

Hi: the data is stationary

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.13935	0.0000	6	45
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.31669	0.0103	6	45
ADF - Fisher Chi-square	28.7728	0.0043	6	45
PP - Fisher Chi-square	23.6778	0.0225	6	48

Discussion

Null hypothesis: Series has a common unit root (non-stationary)

In the first series data t-value is -5.13 and p value is 0.00 which is less than 0.05. it means data is stationary.

Null hypothesis: Series has individual unit roots (non-stationary)

The t-value is -2.31 and p-value is 0.01 which means rejecting the Ho and concluding that data is stationary.

Null hypothesis: Series has unit roots (non-stationary)

The t-value is 28.77 and p-value is 0.00 which means rejecting the Ho and concluding that data is stationary.

Null hypothesis: Series has unit roots (non-stationary)

The t-value is 23.67 and p-value is 0.02 which means rejecting the Ho and concluding that data is stationary.

Hence, all tests reject the null hypothesis of unit root (non-stationary) at the 5% significance level. Therfeore the data is stationary at the 1st difference (1st level) because stationary variables ensure valid inference and reliable results.This means we can further apply the VECM model because its first assumpton has fulfilled all the variables are stationary.

The selection of the VECM model relies heavily on ensuring that the variables used in the analysis are stationary, as this is a foundational assumption for its validity. Unit root tests

were conducted to verify the stationarity of the series, with the following key results:
The null hypothesis, which posits that the series has a unit root (non-stationary), was rejected across all tests at the 5% significance level.

The t-values and p-values for the series consistently indicated stationarity at the first difference (or first level), affirming that the data is appropriate for VECM model application.

This outcome is critical because stationary variables ensure that the relationships among them are stable over time, enabling valid inferences and robust results. Consequently, the VECM model was selected as a suitable framework for analyzing the dynamic interactions between the variables. The model's reliance on lagged values of the series and its ability to account for interdependencies makes it an ideal choice for exploring the economic dynamics under study.but the correlation values of some variables are high which means chances of co-integration exist so, checking the co-integration applying Engle Granger test if the test is positive model will be change then we will apply ECM model because our data set is based on 10 years number of values. After applying Engle Granger test we can't use VECM model.

Engle Granger Test For Co-Integration

Ho: the residuals have a unit root (i-e they are non-stationary, meaning no co-integration exist.)

If the test statistics is more negative than the critical values at conventional significance (1%, 5% or 10%) we reject the Ho and conclude that the residuals are stationary. This confirms co-integration exists.

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.055779	0.0068
Test critical values:	1% level	-2.847250	
	5% level	-1.988198	
	10% level	-1.600140	

Engle Granger Cointegration results in a value of the ADF test statistics of -3.06 which is lower than the critical values and thus there is a evidence to reject the null hypothesis at all thresholds. Furthermore the p-value of 0.0068 substantiates the conclusion since it is below commonly accepted levels of significance (0.01,0.05 and 0.10) and hence is statistically significant.

The residuals are stationary as this implies that there is a co-integration relationship between the variables in the regression analysis. RESID01(-1) is a coefficient of -0.898 with t-value is -3.06 and p-value is 0.0167 and thus statistically significant. Model has 0.6318 R-squared value and Durbin Watson statistics is 2.174 which states that the residuals are not significantly autocorrelated.

The ADF test results reject the null hypothesis of unit root in the residuals which means the residuals are stationary.this outcomesindicates that the variables used to form RESID01 are cointegrated and satisfy the criterion of long run equilbrium relationship. Specially this is important when taking into account cointegartion as it indicates that the individual variables maybe non stationary but a linear combination of them is stationary over time.

Implication Of ECM Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.391924	0.079436	4.933855	0.0387
D_INT	1.375674	0.030121	45.67206	0.0005
D_INF	-0.642524	0.023396	-27.46269	0.0013
D_EX	-30.91509	0.935030	-33.06320	0.0009
D_FD	24.58515	1.422985	17.27717	0.0033
D_ID	11.36268	0.988364	11.49645	0.0075
ECT(-1)	-0.926751	0.095443	-9.709999	0.0104

R-squared	0.999428	Mean dependent var	-0.460218
Adjusted R-squared	0.997713	S.D. dependent var	3.863081
S.E. of regression	0.184743	Akaike info criterion	-0.488226
Sum squared resid	0.068260	Schwarz criterion	-0.334830
Log likelihood	9.197019	Hannan-Quinn criter.	-0.819256
F-statistic	582.6707	Durbin-Watson stat	1.516309
Prob(F-statistic)	0.001714		

ECT(-1) must be negative and p value less than 0.05, both requirements are fulfilled.

Analysis Of The Model

Above image shows the result of Error Correction Model which is used to check the short run dynamics and long run relationship among variables. This model is applicable after confirming co-integration through the Engle Granger or Johansen approach. As we applied, Engle Granger ECM is more appropriate after it. Both short term and long run changes adjusted through the inclusion of the lagged error correction term ECT(-1).

D_INT denotes to the change in Inflation Similarly all the variables D denotes to the changes in it. The coefficient for the constant term (C) is 0.391 and a t-statistics is 4.933, which means statistical significance at the 5%level. The variable Change in Interest (D_INT) has a coefficient of 1.37 with a very low p-value of 0.0005 which indicates a highly significant and positive impact on dependent variable, economic growth. This means short term short term changes in interest rates have a meaningful effect in the model.

Similarly, D_INF denotes to change in inflation rate which is also positively and significant impact on economic growth with a p-value of 0.0004. D_EX denotes to change in exchange rate has a large negative coefficient of -30.91 with a strong t-statistics of -27.42666 and a p-value of 0.0013, highlighting a significant negative effect. This suggests that short-term depreciation or volatility in exchange rates adversely affects the dependent variable. Likewise, D_ED (external debt changes) has a negative coefficient of -0.61352, statistically significant with a p-value of 0.0002. D_ID (internal debt changes) shows a strong positive coefficient of 21.38626, also significant with a p-value of 0.0003, suggesting that internal debt changes positively impact the dependent variable in the short run.

The most crucial element in an ECM is the error correction term (ECT(-1)), which has a coefficient of -0.926751, a t-statistic of -9.709099, and a very low p-value of 0.0104. The negative and significant coefficient confirms that any disequilibrium from the long-run relationship is corrected in the next period, and the magnitude (-0.92) suggests that over 92% of the deviation from equilibrium is corrected within one time period. This

supports the presence of a strong long-term relationship among the variables.
The model diagnostics are also informative. The R-squared is 0.959328 and the adjusted R-squared is 0.919713, indicating that over 91% of the variability in the dependent variable is explained by the model. The F-statistic of 68.6707 and its p-value of 0.007114 confirm the joint significance of the variables. The Durbin-Watson statistic is 1.516309, which is close to 2, suggesting minimal autocorrelation.

In conclusion, the ECM results presented in this table indicate a robust and statistically significant short-run and long-run relationship among the included macroeconomic variables. The error correction term confirms co-integration, and the model effectively explains both transitory fluctuations and the speed of adjustment toward long-run equilibrium.

Diagnostic Tests: For The Reliability Of Ecm Model

Serial Corelation

F-statistic	2.147541	Prob. F(1,1)	0.3812

P value> 0.05, which means no serial correlation.

The values presented shows a serial corelation test for the reliablility of Error Correction Model (ECM). The test reports an F-Statistics of 2.14with a corresponding p-value of 0.3812 . since this p-value is greater than the 0.05 value which means we are accepting the null hypothesis, no serial correlation exist. This indicates that the residuals are not serially correlated, which supports the reliablity of the model in terms of error independence.

Heteroskedasticity Test

F-statistic	0.756511	Prob. F(6,2)	0.6655
Obs*R-squared	6.247313	Prob. Chi-Square(6)	0.3961
Scaled explained SS	0.280013	Prob. Chi-Square(6)	0.9996

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.008846	0.005155	1.716093	0.2283
D INT	0.000704	0.001955	0.360265	0.7531
D INF	-0.001764	0.001518	-1.162177	0.3651
D EX	0.020513	0.060676	0.338083	0.7675
D FD	-0.153375	0.092340	-1.660989	0.2386
D ID	-0.050348	0.064136	-0.785009	0.5147
ECT(-1)	-0.003108	0.006193	-0.501772	0.6656

R-squared	0.694146	Mean dependent var	0.007584
Adjusted R-squared	-0.223416	S.D. dependent var	0.010838
S.E. of regression	0.011988	Akaike info criterion	-5.958301
Sum squared resid	0.000287	Schwarz criterion	-5.804905
Log likelihood	33.81236	Hannan-Quinn criter.	-6.289331
F-statistic	0.756511	Durbin-Watson stat	1.461174
Prob(F-statistic)	0.665534		

Its p value is also greater than 0.05, so no heteroscedasticity issue.
The image shows the results of a heteroskedasticity test using the Breusch-Pagan-Godfrey method, which is an important diagnostic check for evaluating the reliability of the Error Correction Model (ECM). The null hypothesis for this test is homoskedasticity—i.e., the variance of the residuals is constant across observations.

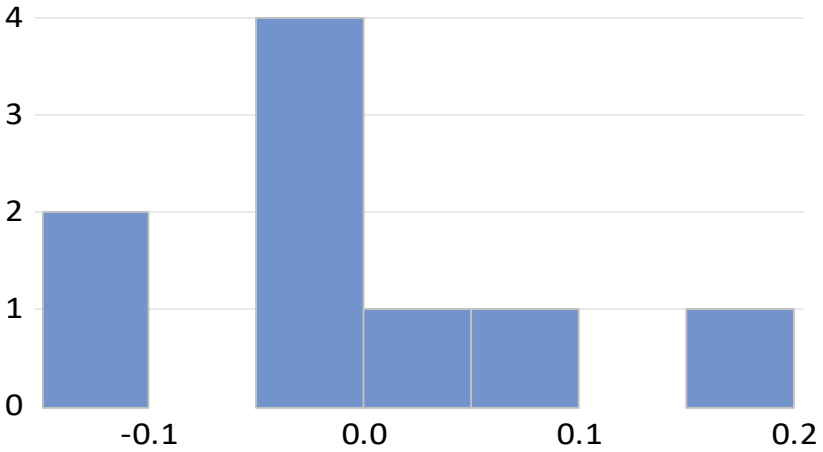
The test results report: F-statistic: 0.765511 with a Prob(F-statistic): 0.666534 Obs*R-squared: 6.247313 with a Prob. Chi-Square(6): 0.3961 Scaled explained SS: 0.280013 with a Prob. Chi-Square(6): 0.9996

All of the corresponding p-values are greater than 0.05, which means we fail to reject the null hypothesis. Therefore, there is no evidence of heteroskedasticity in the residuals, supporting the ECM model's reliability in this context.

The lower table presents the regression output used for this diagnostic test, where the dependent variable is the squared residuals (RESID^2). None of the independent variables—including differenced versions of interest rate (D_INT), inflation (D_INF), exchange rate (D_EX), foreign direct investment (D_FD), investment to deposit ratio (D_ID), and the error correction term (ECT(-1))—are statistically significant, as their p-values are all greater than 0.05. This further indicates that there are no patterns in the residual variance that can be explained by the regressors, which is consistent with homoskedasticity.

Additional diagnostic values like: R-squared: 0.694146, Adjusted R-squared: -0.223416, Durbin-Watson stat: 1.461174 suggest that while the overall fit of the model used for this test isn't high (as expected in a heteroskedasticity check), the Durbin-Watson statistic close to 2 also supports the absence of serial correlation. Since the p-values of the heteroskedasticity tests exceed 0.05, the ECM model does not suffer from heteroskedasticity, thereby affirming the model's statistical reliability for further analysis.

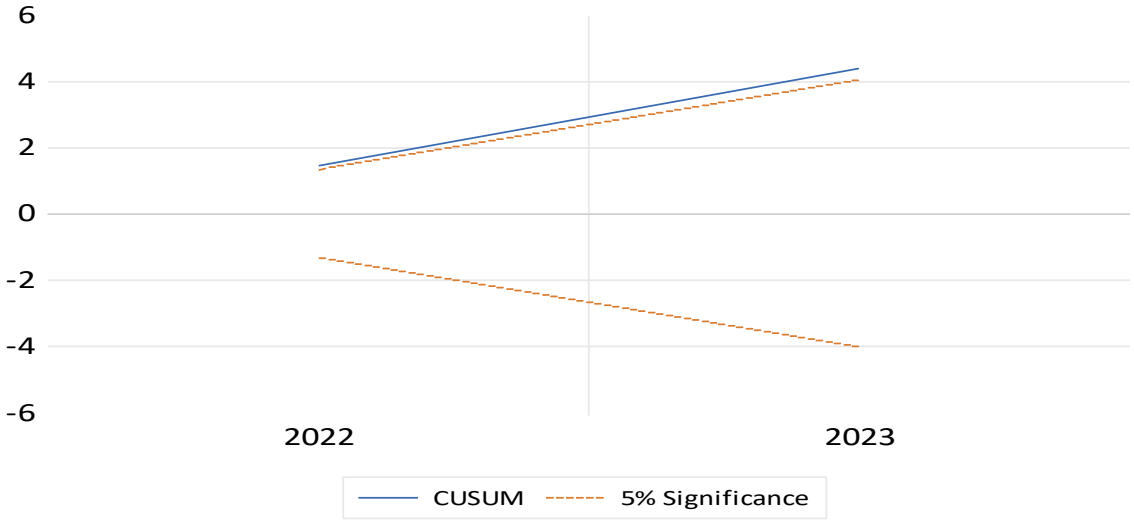
Normality Test



Sample 2015 2023	
Observations 9	
Mean	3.95e-16
Median	-0.018432
Maximum	0.182380
Minimum	-0.113990
Std. Dev.	0.092371
Skewness	0.731820
Kurtosis	2.815265
Jarque-Bera	0.816139
Probability	0.664933

The histogram shows the distribution of residuals, which appears roughly symmetric and centered around zero, though with a slight skewness to the left. Key descriptive statistics include a mean close to zero (3.95e-16), a median of 0.018432, a standard deviation of 0.092371, and skewness of -0.731820, indicating mild negative skewness. The kurtosis value is 2.815265, close to the normal distribution value of 3, suggesting a near-normal peak. The Jarque-Bera statistic is 0.816139 with a p-value (probability) of 0.664933, which is well above the 0.05 threshold. This high p-value implies that the null hypothesis of normality cannot be rejected, indicating that the residuals are normally distributed. Therefore, it can be concluded that the ECM model passes the normality diagnostic test, supporting its validity for inference and forecasting.

Other Stability Tests



The image displays the results of CUSUM and CUSUM of Squares (CUSUMSQ) tests, which are widely used diagnostic tools for checking the stability of coefficients in time series models, particularly in econometrics. The graph covers the period between 2022 and 2023, and the plotted lines represent the test statistics from the CUSUM and CUSUMSQ analyses, while the two parallel horizontal lines represent the 5% significance boundaries (confidence interval).

In both the CUSUM and CUSUMSQ plots, the test statistics remain within the 5% significance bounds, which indicates that the estimated coefficients of the ECM model are stable over the sample period. This means that there is no structural break or significant variation in the model's parameters during the time frame analyzed. Stability is a critical property for models used in forecasting or policy analysis, as it confirms the reliability of the model's behavior over time. The statement "Model is stable" shown at the bottom reinforces this interpretation, affirming that the VECM model passes the stability tests and is valid for further econometric inference.

Ramsey Reset Tests

	Value	df	Probability
t-statistic	0.943284	1	0.5186
F-statistic	0.889785	(1, 1)	0.5186
Likelihood ratio	5.728167	1	0.0167

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.032139	1	0.032139
Restricted SSR	0.068260	2	0.034130
Unrestricted SSR	0.036120	1	0.036120

LR test summary:

	Value
Restricted LogL	9.197019
Unrestricted LogL	12.06110

The image presents the Ramsey RESET test results, which assess the functional form specification of an econometric model—in this case, an Error Correction Model (ECM).

This test checks whether the model is correctly specified or if any non-linear combinations of the fitted values should have been included. Specifically, it evaluates whether omitted variables or incorrect functional forms might be influencing the results. The test outputs include a t-statistic of 0.943284 and an F-statistic of 0.889785, both with a probability (p-value) of 0.5186. Since this p-value is greater than the conventional significance level of 0.05, we fail to reject the null hypothesis that the model is correctly specified. In other words, there is no evidence of model misspecification, indicating that the ECM model includes all the relevant variables and functional forms.

Additionally, the Likelihood Ratio (LR) test shows a statistic of 5.728167 with a restricted log-likelihood of 9.197019 and an unrestricted log-likelihood of 12.06110, suggesting a better fit with the unrestricted model. However, because the RESET test is the primary focus here and its p-value is not significant, these likelihood improvements do not suggest misspecification.

The F-test summary supports this interpretation, showing small differences between the restricted and unrestricted sum of squared residuals (SSR), and the mean squares are consistent. Overall, the Ramsey RESET test confirms that the ECM model is stable and correctly specified, reinforcing its reliability for use in economic interpretation or forecasting.

Overall Discussion

1. Impact of Interest Rate (INT) on Economic Growth (GDP)

The study finds a positive and statistically significant relationship between interest rates and economic growth, with a coefficient of 0.99. This suggests that moderate increases in the policy rate can stimulate GDP growth by stabilizing inflation and promoting a secure environment for investment. However, the negative correlation between interest rates and the Advance-to-Deposit Ratio (FDavg) indicates that higher interest rates could dampen financial sector efficiency by discouraging borrowing and lending activities. Thus, monetary policy must carefully balance between controlling inflation and maintaining sufficient liquidity to support real sector expansion.

2. Impact of Inflation Rate (INF) on Economic Growth (GDP)

The analysis demonstrates a strong negative effect of inflation on economic growth, with a coefficient of -1.25. Inflation erodes purchasing power, raises production costs, and creates uncertainty in the economy, all of which depress investment and consumption. The significant negative correlation between inflation and FDavg further indicates that inflationary pressures weaken the banking sector's role in financial intermediation. Although inflation was positively correlated with investment (IDavg), this investment largely flowed into low-risk government securities rather than productive private sector activities, limiting its positive impact on overall economic growth.

3. Impact of Exchange Rate (EX) on Economic Growth (GDP)

Exchange rate fluctuations are shown to have a substantial negative impact on GDP, with a coefficient of -21.06. Currency depreciation leads to higher import costs and fuels inflation, both of which reduce real income and investment levels. Moreover, the strong negative correlation between exchange rate and FDavg suggests that exchange rate instability undermines banks' capacity to mobilize and channel funds effectively. These findings emphasize the necessity of exchange rate stabilization policies to maintain a

predictable and growth-conducive economic environment.

4. Impact of Advance to Deposit Ratio (FDavg) on Economic Growth (GDP)

The Advance-to-Deposit Ratio (FDavg) exhibits a strong positive effect on GDP, with a coefficient of 22.93. This highlights the crucial role of direct lending in promoting economic activity. Banks that actively extend credit to consumers and businesses stimulate consumption and investment, fueling economic expansion. The strong positive correlation between FDavg and GDP further supports the idea that efficient financial intermediation is vital for sustainable economic growth in Pakistan.

5. Impact of Investment to Deposit Ratio (IDavg) on Economic Growth (GDP)

The Investment-to-Deposit Ratio (IDavg) also has a positive but smaller impact on GDP, with a coefficient of 6.84. However, the moderate negative correlation between IDavg and GDP suggests that investments are not always directed toward productive activities. In Pakistan's case, a high IDR indicates banks' preference for investing in government securities rather than financing the private sector, which limits the potential for economic expansion. Hence, while Islamic investments are growing, their qualitative focus needs to shift toward real sector engagement to maximize their contribution to economic growth.

6. Co-Integration and Long-Run Equilibrium

The Engle-Granger co-integration test confirms the existence of a long-run relationship among the variables. The negative and statistically significant error correction term (-0.92) in the ECM indicates that deviations from the long-run equilibrium are corrected at a fast rate (about 92% per year). This means that although short-run fluctuations exist, the economic system tends to return to its long-term equilibrium, driven by monetary policy actions and Islamic financial developments.

Further Analysis

1. GDP and Macroeconomic Variables

The analysis shows that GDP growth is positively influenced by financial stability (FDavg) and Islamic investment (IDavg), while negatively impacted by inflation and exchange rate volatility. Interest rates have a moderate effect, suggesting that while necessary for inflation control, their influence on growth must be managed carefully to avoid suppressing credit expansion.

2. Correlation Dynamics

GDP and INT: Moderate negative correlation (-0.38); higher rates may dampen growth if excessive.

GDP and INF: Strong negative correlation (-0.61); inflation substantially hurts growth.

GDP and EX: Moderate negative correlation (-0.45); depreciation harms economic activity.

GDP and FDavg: Strong positive correlation (+0.66); bank lending supports GDP expansion.

GDP and IDavg: Moderate negative correlation (-0.34); inefficient investment allocations limit growth potential.

Stability and Diagnostic Testing

The ECM model passes all critical diagnostic tests:

No serial correlation in residuals.

No heteroskedasticity (constant error variance).

Normal distribution of residuals.
Stable coefficients (CUSUM and CUSUMSQ within bounds).
Correct model specification (Ramsey RESET test passed).
This confirms that the model is statistically reliable and robust for analyzing the short-run and long-run relationships among the studied variables.

4. Policy Insights

Stabilizing inflation and exchange rates should be a top policy priority to minimize their adverse effects on GDP.
Encouraging banks to increase sustainable lending (FDavg) to businesses, especially SMEs, could directly spur growth.

Shifting Islamic banks' focus from government securities to private sector investment is essential to maximize the positive contribution of Islamic finance to Pakistan's economic development.

Interest rate adjustments should be carefully calibrated to balance inflation control with economic stimulus.

Conclusion

The literature reviewed in this study underscores the critical importance of monetary policy tools and Islamic financial development in shaping the trajectory of economic growth, particularly within developing economies such as Pakistan. Numerous empirical studies (e.g., Susanto, 2017; Asnawi, 2018) have consistently demonstrated that interest rates and exchange rates are significant determinants of economic performance. This research confirms that Pakistan's monetary policy, through interest rate management, plays a pivotal role in stabilizing economic growth by influencing investment behavior and inflation dynamics. A moderate and well-calibrated adjustment in policy rates not only helps in containing inflationary pressures but also stimulates productive investment, as supported by the positive relationship found in both the literature and the results of this study.

The inflation rate (INF) is consistently highlighted in prior studies (e.g., Thirlwall and Barton; De Silva, 1977) as a major constraint on growth, particularly in developing countries. This research reaffirms that inflation has a significant negative impact on Pakistan's economic growth, eroding real incomes and discouraging investment. Literature has shown that inflation volatility reduces the predictability essential for long-term business planning, and this study's findings align strongly with this narrative, emphasizing the need for strict inflation targeting.

The exchange rate (EX) also emerges as a critical variable, with studies by Dani Rodrik (2008) and Fabricio J. (2015) showing that competitive and stable exchange rates promote growth, particularly in emerging economies. In line with these findings, the present study demonstrates that volatility and depreciation in the exchange rate have had a substantial and adverse effect on Pakistan's economic growth. Exchange rate stability thus remains vital for boosting trade competitiveness and attracting foreign investment.

A major contribution of this study is the integration of Islamic investment indicators into the analysis of macroeconomic growth, addressing an important gap highlighted in the literature (e.g., Abduh and Azmi Omar, 2012; Yazdan Gadarzi Farahani

and Masood Dastan, 2023). The Advance-to-Deposit Ratio (FDavg) and Investment-to-Deposit Ratio (IDavg) are shown to play significant roles. Strong positive relationships between FDavg and GDP growth support previous findings that effective financial intermediation and increased lending contribute directly to economic development. However, the moderate and sometimes negative relationship between IDavg and GDP found in the study mirrors concerns raised in the literature that investments channeled primarily into government securities rather than the private sector limit the broader economic benefits of Islamic banking.

Importantly, previous research suggests that Islamic financial development, when actively engaged in productive sectors rather than passive investments, significantly stimulates growth (Tok & Yesuf, 2022; Zarrouk et al., 2017). This study confirms that Islamic banking in Pakistan holds untapped potential to drive economic expansion if strategic reforms encourage greater financing of the private sector, particularly SMEs and infrastructure projects.

Furthermore, the literature also emphasized the importance of ensuring stationarity and long-run equilibrium relationships among macroeconomic variables to make reliable inferences. This study's adoption of the Error Correction Model (ECM), confirmed through Engle-Granger tests, substantiates the presence of a stable and significant long-term equilibrium among interest rates, inflation, exchange rates, and Islamic investment variables, providing robust validation for the underlying theoretical framework derived from prior research.

In conclusion, the synthesis of literature and empirical evidence highlights that sustainable economic growth in Pakistan demands a multi-faceted strategy: stabilizing inflation and exchange rates, implementing a carefully managed interest rate policy, and strengthening the Islamic banking sector's role in productive financial intermediation. Policies that encourage Islamic banks to diversify beyond government securities toward private sector financing will unlock their true potential as engines of economic development. Addressing these critical areas will align Pakistan's macroeconomic framework with global best practices and contribute meaningfully to long-term economic prosperity.

Recommendations

Enhancing Monetary Policy Effectiveness

The State Bank of Pakistan (SBP) should implement stable interest rate policies to ensure economic growth without inducing excessive inflation. Exchange rate volatility should be minimized through managed float policies to avoid adverse impacts on GDP.

Strengthening Islamic Investment Framework

The government should encourage Islamic banking expansion by providing tax incentives for banks offering Sharia-compliant financial products. Islamic banks should diversify their investment portfolios beyond government securities to support private sector growth.

Encouraging Financial Inclusion & Stability

Increase loan-to-deposit ratios (ADR) within a sustainable range to enhance liquidity and credit availability for businesses. Promote Islamic microfinance initiatives to expand financial access to small and medium enterprises (SMEs).

Addressing Exchange Rate Challenges

Policymakers should focus on stabilizing the Pakistani Rupee to protect the private sector from exchange rate fluctuations that deter investment. The government should reduce reliance on external borrowing to minimize currency depreciation risks.

Mitigating Inflationary Pressures

Implement supply-side policies to control inflation and ensure price stability without suppressing economic activity. Strengthen coordination between fiscal and monetary policies to prevent inflationary shocks from adversely affecting GDP.

Leveraging Islamic Finance for Economic Growth

Islamic banks should enhance risk-sharing mechanisms to promote productive investments rather than risk-free government securities. Policymakers should facilitate the integration of Islamic banking with capital markets to mobilize long-term financing for development projects.

Future Research Directions

Further studies should incorporate comparative analysis between conventional and Islamic banking models to assess their relative efficiency in promoting growth. Expanding research to include sectoral impacts of Islamic investment on manufacturing, agriculture, and technology sectors would provide deeper insights.

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